Appendix D
Mixture Proportioning Sample Submittal

HARCON INCORPORATED
P.O.BOX 2661
POCATELLO, ID. 83206-2661

SHOTCRETE MIX DESIGN (BY VOLUME) Mix # 1

Project # DACW 68-91-C-0002

LOWER MONUMENTAL PERMANENT JUVENILE FISH BYPASS FACILITIES

Shotcrete Producer: Connell Sand & Gravel, Inc., Connell, Wa.
Shotcrete Uses: Gallery Lining

W/C ratio <= 0.40, Entrained air = NA
Cement from: South Dakota Cement

C.A.= 3/8" x #4 w/ ASTM C 33 combined gradation per 3B-6.3
Bulk S.G.: SSD = 2.81 Absorption = 2.2%
Source = Connell Sand & Gravel

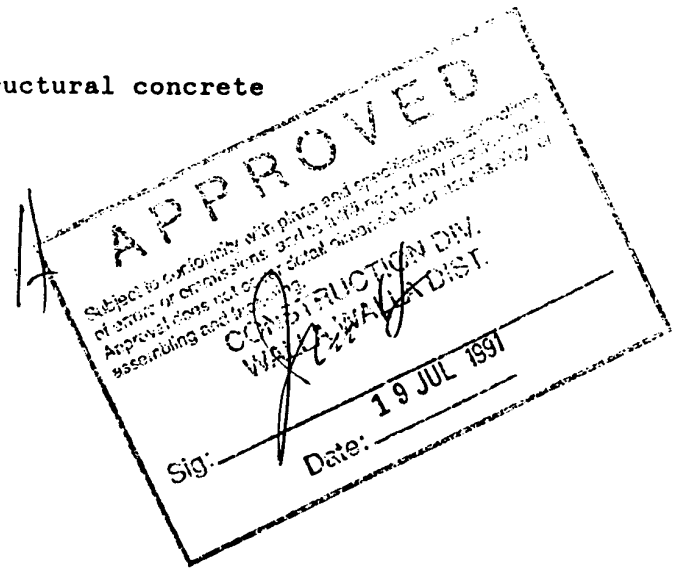
F.A.= Concrete Sand w/ ASTM C 33 combined gradation per 3B-6.3
Source = Connell Sand & Gravel
Bulk S.G.: SSD = 2.706 Absorption = 3.2% F.M. = 3.01

COMPUTATION of 1 CY TRIAL MIX Revised 5/22/91

Ingredients	Batch Weights		S.G. SSD	Volume
WATER @ W/C = 0.36	256		1.000	4.095
CEMENT T I-II LA	705		3.150	3.587
C.A. (3/8"x#4)	640	0.21	2.590	3.960
F.A.	2450	0.79	2.625	14.957
SILICA FUME	56	0.08	2.200	0.408
VOLUME				27.006

Additives: None

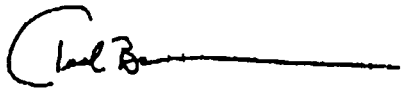
Water Source: Same as for structural concrete



91-02---3B-2.1----1

TILBURY CEMENT COMPANY		
DATE-06-04-91 **Connell Sand & Gravel**		
Sieve Size	Percent Passing	Specification
3/8"	100	100
#4	98	95-100
8	77	80-100
16	70	50-85
30	42	25-60
50	15	10-30
100	5	2-10
200	2	
F M	2.83	
Screen Size	Percent Passing	ASTM Specification
3/8"	100	85-100
#4	13	10-30
#8	4	0-10
#16	0	0-5
Screen Size	80% Sand 20% 3/8" Percent Passing	Specification
1/2"	100	100
3/8"	100	90-100
#4	81	75-85
8	62	50-75
16	55	35-55
30	34	20-35
50	12	8-20
100	4	2-10

TESTED BY



INTERMOUNTAIN MATERIALS TESTING, INC.
7446 Lemhi St., Boise, Idaho 83709 (208) 376-8203
1718 West A St., Pasco, Washington 99301 (509) 547-1121

Materials Engineering and Testing • Construction Inspection • Project Consultation

REPORT TO: Fausett Mine Services
P.O. Box 968
Osbourn, ID 83849

DATE: 6-26-91
FILE NUMBER: 91-53
SHEET: 2 of 6
INVOICE: T910279

PROJECT: Lower Monumental Dam

Sample Identification

On May 29, 1991, your personnel delivered to our laboratory shot crete cores. It was reported that the test panels were shot on May 22, 1991, by your operator, Rainville. The panels were reportedly shot at horizontal position, using mix #1 (7.5 bag mix with 8% silica flume).

At your request, we performed compressive strength tests in accordance with ASTM C42. The test results are as follows.

Test Results

Lab Number	Date Tested	Age	Length / Diameter	Compressive Strength PSI
911833	6-05-91	14	4.88 / 2.75	4100
911834	6-05-91	14	4.88 / 2.75	4130
911838	6-19-91	28	3.50 / 2.75	6770
911839	6-19-91	28	4.875 / 2.75	6180

Reviewed by Lew A. Beck

INTERMOUNTAIN MATERIALS TESTING, INC.
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Materials Engineering and Testing • Construction Inspection • Project Consultation

REPORT TO: Fausett Mine Services
P.O. Box 968
Osbourn, ID 83849

DATE: 6-26-91
FILE NUMBER: 91-53
SHEET: 4 of 6
INVOICE: T910279

PROJECT: Lower Monumental Dam

Sample Identification

On May 29, 1991, your personnel delivered to our laboratory shot crete cores. It was reported that the test panels were shot on May 22, 1991, by your operator, Easley. The panels were reportedly shot at horizontal position, using mix #1 (7.5 bag mix with 8% silica flume).

At your request, we performed compressive strength tests in accordance with ASTM C42. The test results are as follows.

Test Results

Lab Number	Date Tested	Age	Length / Diameter	Compressive Strength PSI
911854	6-17-91	26	4.375 / 2.75	3910
911855	6-17-91	26	4.625 / 2.75	3860
911856	6-19-91	28	4.00 / 2.75	6480
911857	6-19-91	28	4.50 / 2.75	6700

Reviewed by Lew A. Beck

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1718 West A St., Pasco, Washington 99301 (509) 547-1121

Materials Engineering and Testing • Construction Inspection • Project Consultation

REPORT TO: Fausett Mine Services
P.O. Box 968
Osbourn, ID 83849

DATE: 6-26-91
FILE NUMBER: 91-53
SHEET: 6 of 6
INVOICE: T910279

PROJECT: Lower Monumental Dam

Sample Identification

On May 29, 1991, your personnel delivered to our laboratory shot crete cores. It was reported that the test panels were shot on May 22, 1991, by your operator, Cunningham. The panels were reportedly shot at horizontal position, using mix #1 (7.5 bag mix with 8% silica flume).

At your request, we performed compressive strength tests in accordance with ASTM C42. The test results are as follows.

Test Results

Lab Number	Date Tested	Age	Length / Diameter	Compressive Strength PSI
911871	6-17-91	26	6.25 / 2.75	5920
911872	6-17-91	26	6.125 / 2.75	5860
911873	6-19-91	28	3.875 / 2.75	6130
911874	6-19-91	28	4.625 / 2.75	6120

Reviewed by Lew A. Beck

SOUTH DAKOTA CEMENT

360
Street
SD 57709-0360

AMERICAN OWNED & OPERATED

Phone (605) 342-4752
FAX (605) 342-4742

To: Connell Sand & Gravel Inc.
P.O. Box 156
Connell, Wy. 99326

Re: DACW68-91-C-0002
Franklin Co. Lower Monumental
Permanent Juvenile Fish
Bypass Facility

CERTIFICATION OF COMPLIANCE:

This is to certify that all Dakota Type I-II LA Portland Cement shipped to you meets or exceeds the quality standards set forth by the American Society for Testing and Materials (ASTM C - 150 - 89).

Questions concerning these specifications may be directed to this office at the above number.

Court Patterson
Signature
Quality Control Manager

30 January, 1991
Date

HARCON INCORPORATED
P.O. BOX 488
KAMILOTUS, WA 99335-0488
LOWER MONUMENTAL PERMANENT JUVENILE FISH BYPASS FACILITY
FRANKLIN COUNTY WASHINGTON
Contract No. DACW 68-91-C-0002
Reviewed
Reviewed As Noted Resubmit
Rejected, Resubmittal Required
Approved
Signature
Date 1/31/91
Item No. 1
Transmittal No. 312-02

RECEIVED
CONSTRUCTION DIV.
WALLA WALLA DIST.
Sig:
Date: 26 FEB 1991

3A G1.1

91-02---3A-002----1

D-7

Post-it™ brand fax transmittal memo 7671	# of pages ▸
To	From D. Bakken
Co. Connell Sand & Gravel	Co. 3A Cement
Dept.	Phone # 605-342-4255
Fax # 509-282-3437	Fax # 605-342-4744

1/31/91 & 3A-2 3A-1

CERTIFICATE OF COMPLIANCE
DACOTAH CEMENT
RAPID CITY, SOUTH DAKOTA

		CAR #	LBS.	CAR #	LBS.
DATE.............1-21-91		BN 441440	195700		
ORDER #...........MC-921		BN 441234	197000		
CONSIGNED TO:.....TILBURY CEMENT					
DESTINATION.......PASCO, WA					

TYPE: I-II LA BIN # 39	LAB# 51915	A.S.T.M. C-150-89 SPECIFICATION LIMIT		DACOTAH CEMENT
CHEMICAL		TYPE I	TYPE II	ANALYSIS
Silicon dioxide, min, % (SiO2)			20.00	22.67
Aluminum oxide, max, % (Al2O3)			6.00	4.44
Ferric oxide, max, % (Fe2O3)			6.00	3.32
Magnesium oxide, max, % (MgO)		6.00	6.00	[illegible].12
Sulfur trioxide, max, % (SO3)				2.15
When (C3A) is 8% or less		3.00	3.00	
Loss on ignition, max, %		3.00	3.00	0.[illegible]3
Insoluble residue, max, %		0.75	0.75	0.[illegible]2
Tricalcium aluminate, max, % (C3A)			8.00	6.[illegible]
Alkalies, max, % (*) (as Na eq.)		0.60	0.60	0.5[illegible]
PHYSICAL				
Blaine Fineness, (M2/Kg), min		280	280	385
Autoclave expansion, max, %		0.80	0.80	-0.02
Gillmore initial set time, min.		1:00	1:00	2:30
Gillmore final set time, max.		10:00	10:00	4:30
Vicat setting time,min,not less than		:45	:45	2:10
max,not more than		6:15	6:15	
3 Day Compressive Strength, p.s.i.		1800	1500	3185
7 Day Compressive Strength, p.s.i.		2800	2500	4753
28 Day Compressive Strength, p.s.i.		4000	4000	6820
Air content of mortar,volume, max, %		12.0	12.0	8.7
False set final penetration, min,(*)		50	50	

RECEIVED
CONSTRUCTION DIV.
WALLA WALLA DIST.
Sig:
Date: 6 FEB 1991

(*) Optional Requirements
This will certify that the above described shipment of DACOTAH cement meets current ASTM C150-89 and AASHTO M85 specifications. All testing complies with the requirements by A.S.T.M. for Portland Cement. WE ARE NOT RESPONSIBLE FOR ANY ADDITIVES NOT STATED IN THE CERTIFICATE OF COMPLIANCE.

DATE OF REPORT....01/22/91 CHEMIST.. Court Patterson

C3S...... 48.16
C4AF..... 10.11

91-02--3A-002---2

Master Builders Technologies

Master Builders, Inc.
23700 Chagrin Boulevard
Cleveland, Ohio 44122-5554
Phone 216/831-5500
Telex 980-305

June 12, 1991

Certificate of Quality
Master Builders Raw Silica Fume Mineral Admixture (West Coast Source)

Re: Corps. of Engineers Projects

TO WHOM IT MAY CONCERN:

State of Ohio)
County of Lake) ss

Before me, a Notary Public, in and for the aforesaid State and County, personally appeared Brian E. Caine, who being duly sworn, deposes and says:

That he is Manager, Chemistry Laboratory for Master Builders, Inc., Cleveland, Ohio; and

That Raw Silica Fume Mineral Admixture (West Coast Source) is Master Builders dry uncompacted silica fume mineral admixture for improving the properties of hardened concrete, especially strength and impermeability; and

That Raw Silica Fume Mineral Admixture (West Coast Source) meets the following Master Builders quality assurance acceptance criteria:

Silicon dioxide (SiO_2), min, %	85.0
Available alkalies, as Na_2O, max, %	1.5
Moisture content, max, %	3.0
Loss on ignition, max, %	6.0
Amount retained on U.S. No. 325 Sieve, max, %	10.0*
Pozzolanic Activity**	Not Tested
Uniformity of Density***	Not Tested

* Recent production runs have shown retained amounts of less than 5%.
** Silica Fume containing more than 85% SiO_2 is certainly pozzolanic. Pozzolanic activity was developed to test the effectiveness of fly ash and has no meaning with silica fume.
*** Master Builders does not use density as a measure of uniformity. This silica fume is from a furnace in which only one metal product is made. This test has more meaning for fly ash than silica fume.

Subscribed and sworn to before me
this 12th day of June, 1991

Brian E. Caine
Manager, Chemistry Laboratory
Admixture Research & Development

Robert C. Miller
Robert C. Miller, Notary Public
State of Ohio
My Commission Expires February 7, 1996
(Recorded in Lake County)

Doc. 5325